



Big Data and Analytics in Tourism and Hospitality: Opportunities and Risks

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Introduction: the rise of big data and analytics

Technology (and its rapid development) is one of the key megatrends and driving forces that are seen to shape the future of tourism (Yeoman, 2012, 2018; Yeoman and McMahon-Beattie, 2018) through changes that will impact the way tourism and hospitality providers interact with travellers. At the same time, technological advances within tourism create changes in consumer behaviour (Urquhart, 2019) and, subsequently, significant opportunities for tourism organisations to use technology in order to gain competitive advantage. A recent business report on key megatrends and market disruptors suggests that technology and new ways of engaging and interacting with customers are fuelling the rate of disruption as, today, businesses are able to reach new customers in new ways and can reinvent customer engagement around service and convenience (Boumphrey, 2019). Key to this ‘know-how’ is a consumer centricity approach which is important for an evolved tourism and hospitality offer and service. (Ibid.)

Within this megatrend context, the role of customer data and information is therefore critical for tourism organisations in order to provide an increasingly authentic, unique, and inspirational travel experience, as well as convenience to tourism and hospitality customers. Equally important, data and information have a significant role in meeting the needs of the tourists of future, namely children (Schänzel and Yeoman, 2015; Séraphin and Green, 2019). One of the most important uses of data is to improve personalisation, travel companies using the information they gather to make specific adjustments to their offerings.

Nowadays, vast amounts of structured and unstructured data are produced globally (Nunan and Di Domenico, 2013; Verdino, 2013), a so-called “digital exhaust” (Wang, 2013; Barocas and Nissenbaum, 2014) which is generated passively by users of products and services through use of mobile devices (Shilton, 2009), an abundance of publicly available data shared on social networking platforms (Nov, Naaman and Chen, 2010), and customer data and information purposely collected by tourism organisations’ booking systems or customer relations management (CRM) systems.

This abundance of data and the act of processing data on a large scale has led to the concept of ‘Big Data’ which Mayer-Schönberger and Cukier (2013) define as “things one can do at a large scale that cannot be done at a smaller one, to extract new insights or create new forms of value, in ways that change markets, organisations, the relationship between citizens and governments, and more” (p. 6). Indeed, one of the latest Euromonitor International travel industry reports confirms that big data and analytics is expected to be the most influential technology impacting the industry in the next five years (Bremmer, 2019), followed by artificial intelligence and the internet of things. However, all these technological developments have subsequent implications for personal privacy (Culnan and Bies, 2003; Sarathy and Robertson, 2003; **Blakesley and Yallop, 2019**) and for subsequent data governance frameworks that tourism organisations need to develop and implement to ensure competitive and ethical business practices. The use of data is viewed as a disruptive innovation in the tourism and hospitality industry, despite the fact that it allows organisations in the industry to facilitate personalisation, offer convenience, save costs, and overall, gain competitive advantage (Evans, 2020).

In this paper we explore the question of how the use of data, analytics and business insight might change the landscape of tourism and hospitality services and provide an argument for the need to establish ethical data management systems as platform for competitive advantage.

Big data and analytics: opportunities and risks

Big data and analytics are regarded as beneficial to businesses in general and the tourism and hospitality industry in particular. Indeed, 'each stage of the consumption behaviour is influenced by different aspects of the technology advancement' (Bavik, Boyol Ngan and Ekiz, 2017: 413). Data analytics supports business decision-making and research insight (Fitzgerald, McCarthy, Carton, O'Connor, Lynch and Adam, 2016), analytic insight (IBM, 2014), enabling large-scale volumes of data to be reviewed in a user-friendly fashion (Mazumder and Dhar, 2018). Other improvements in cloud infrastructure and hardware supporting big data have lowered the costs of these services and have improved their performance (Mazumder and Dhar, 2018). These technological advances provide significant opportunities for businesses to harness the wealth of data to support their activities and gain competitive advantage. Efficient uses of data and analytics drive process and cost efficiencies, as well as strategy and change (MicroStrategy, 2018).

Specifically, in the tourism and hospitality sector, effective uses of big data are associated with revenue management (e.g. using and combining internal data, such as occupancy rates and current bookings, with external data, such as information about local events, school holidays, flights information in order to forecast demand and maximise revenues); market research and strategic marketing purposes (e.g. identifying customer trends to **best cater** marketing opportunities); customer experience and reputation management (e.g. social media conversations and online reviews, service usage data and internal feedback through customer surveys). A good example of an organisation that uses big data successfully to gain competitive advantage is AirBnb (Evans, 2020; Guttentag, 2019).

Nevertheless, whilst big data is generally regarded as beneficial to business (Strong, 2013), the literature that critiques big data posits that there are widely held ethical and privacy concerns about it (Richards and King, 2014; Román, 2007; Barocas and Nissenbaum, 2014; **Blakesley and Yallop, 2019**), as well as concerns around security (Nunan and Di Domenico, 2013), extraction of relevant information from the wealth of data (Fulgoni, 2013), mistakes in interpretation (Mayer-Schönberger and Cukier, 2013), and not least the risk of data breaches (Mayer-Schönberger and Cukier, 2013).

These concerns have been intensified by recent global cyber-attacks and, more specifically, by significant data breaches in a wide range of industries and sectors, including the tourism and hospitality industry (Armerding, 2018; PwC, 2016, 2017). The hospitality industry is now in the media spotlight due to high profile breaches (PwC, 2016, 2017).

One of the biggest data breaches of the 21st century has affected one of the largest hospitality companies, Marriott International. Starting in 2014, the data breach occurred on systems supporting Starwood hotel brands, which were acquired by Marriott in 2016, and affected approximately 500 million customers worldwide, with the breach only being discovered in September 2018. Data and information on names, contact information, passport numbers, travel information and other personal information were compromised, and information on

credit card numbers and expiration dates of more than 100 million customers was stolen (Armerding, 2018).

Not surprisingly then, privacy is now the top data issue and concern for organisations. Indeed, the 2018 Global State of Enterprise Analytics survey found that globally 49% of companies surveyed believed that the main challenges organisations most commonly face are data privacy and security concerns (MicroStrategy, 2018). Similarly, another recent industry report shows that over 40% of tourism industry professionals claimed that data privacy and cybersecurity are one of the most influential factors impacting digital commerce in this sector (Bremmer, 2019).

When selecting analytics solutions, tourism and hospitality organisations need to address the growing concerns around privacy and security of customer data by putting in place well-designed data governance frameworks capable of providing quality data and, at the same time, be able to provide effective frameworks of data security and protection for all stakeholders. This becomes even more important in the future due to the rapid shift toward more forward-looking, and even automated, data-driven organisations (Harvard Business Review Analytic Services, 2019). In the tourism and hospitality industry for instance, international hotel chains are now relying on robots to deliver some of their services, e.g. Henn Na Hotel (Japan) is the world-first hotel staffed by robots, using robots to deliver customers' luggage to their rooms, Hilton (USA) use robots for their concierge services, etc.

Data governance in tourism and hospitality: an expanding context

Data governance refers to the policies and procedures adopted by organisations to manage data and is a cross-functional framework for managing data as a strategic enterprise asset (Abraham, Schneider and vom Brocke, 2019). It therefore entails the development of a framework for managing data and information and provides the right sets of data and actionable insight for business decision-making (Riggins and Klamm, 2017). Similarly, Sarsfield (2009) defined a data governance framework as a set of processes that ensures that important data assets are formally managed throughout the organisation.

Data governance's main goal is to generate a competitive advantage for organisations by creating a holistic approach to important organisational data (Abraham *et al.*, 2019). Previous research and industry reports on data governance however point out that data governance approaches tend to focus on single aspects of data governance, particularly showing more interest in data quality issues and compliance (Abraham *et al.*, 2019; Otto, 2011).

However, one of the top strategic technology trends in 2019 according to the Gartner Group, a global research and advisory firm, is digital privacy and ethics (Panetta, 2018). The report suggests that conversations regarding privacy must be grounded in ethics and trust, and that conversations should move from "Are we compliant?" toward "Are we doing the right thing?" (Panetta, 2018), because nowadays consumers have a growing awareness about the value of their personal data and information, and they are more sensitive towards the use of their personal data by organisations (*Ibid.*). For all these reasons the context of data governance and the subsequent data governance frameworks developed by tourism and hospitality organisations need to expand from solely compliance-based frameworks to inclusion of privacy and ethics solutions for an equitable and ethical exchange of data and information.

Potential frameworks for ethical data management and digital privacy specific to tourism and hospitality would need to identify, in addition to the protections afforded under the recent General Data Protection Regulation (GDPR) (ICO, 2018), how data is collected, what it is used for, who has access to it and why. It should also highlight to consumers the specific benefits they could expect from the disclosures they make, either by using tourism and hospitality services or by providing feedback about these services online.

To be successful, tourism organisations must gain and maintain trust with the customer, and they must also follow internal organisational values to ensure customers view them as trustworthy (Panetta, 2018). The use of consumers' personal data by organisations can be viewed as an opportunity as well as a threat (Strong, 2013) and can, if managed legally, ethically and effectively, lead to competitive advantage through greater insight into consumer behaviour both online and offline (Blakesley and Yallop, 2019). Hence, tourism and hospitality organisations must ensure that the insights into the behaviour of their consumers does not come at the cost of violation of their privacy (Smith, Milberg and Burke, 1996), instead placing equal weight on efforts to achieve both objectives.

Conclusion

Big data and analytics are playing a crucial role in digital transformation efforts of organisations in general and in the tourism and hospitality industry in particular, driving greater effectiveness and efficiency as well as the strategy to define new business models and bring about successful change (Evans, 2020; MicroStrategy, 2018).

In this trends paper we reflected on the rise of big data and analytics, which is expected to be one of the most influential technologies impacting the industry in the next five years. The use of innovative ethical data management is an effective strategy to increase sales revenue by providing the tourism and hospitality organisation with valuable business insights for on-going marketing activity and competitive advantage (Abraham *et al.*, 2019; Evans, 2020). Nevertheless, the concerns and issues arising from data privacy and security deserve thoughtful future consideration, hence the reason this paper is making the case for research on data governance and data ethics in tourism and hospitality.

More research is needed for a greater understanding of ways to alleviate the risks posed by the rapid advances in technology in general, and the use of big data and analytics in business decisions in particular. In the quest for ethical data management practices, the tourism and hospitality industry would benefit from updated, relevant and centralised ethical standards on data privacy and security, and from research that further develops ethical data governance frameworks in the context of tourism and hospitality.

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